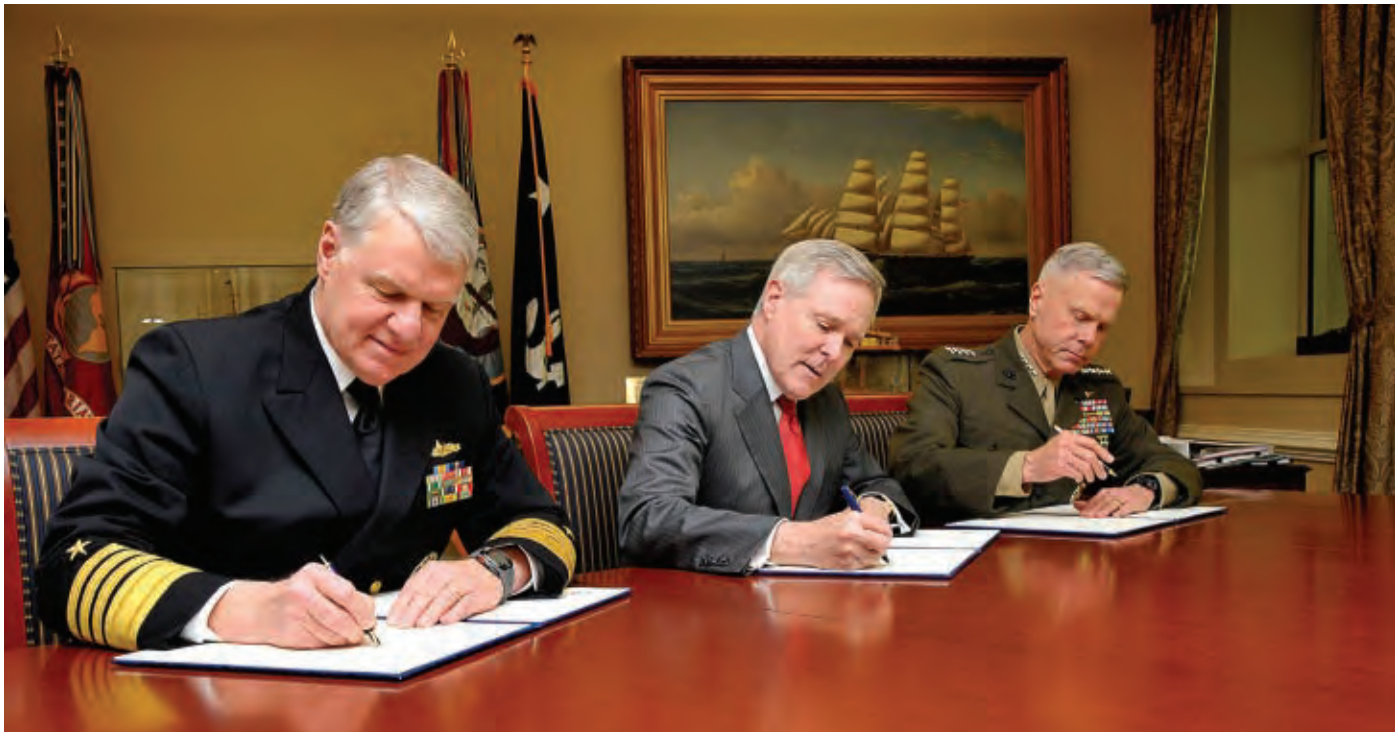
F–35B Needs a Plan B

Options to rising costs of the aircraft

by Maj Christopher J. Cannon



ADM Gary Roughead, Chief of Naval Operations; Secretary of the Navy Ray Mabus; and Gen James F. Amos, Commandant of the Marine Corps, sign the tactical aviation agreement. *(U.S. Navy photo by Chief Mass Communications Specialist Tiffini Jones Vanderwyst.)*

In December 2010 the Commandant was quoted as stating "there is not a plan B" to the F–35B program.[1] In effect our Marine Corps has "derivatives of plan A," based on a 1998 decision, that all rely on the short takeoff/vertical landing (STOVL) F–35B being produced. "We decided we would skip a generation of what we called fourth-generation airplanes . . . and we would end up putting all of our money and our hopes in the F–35B." This decision has become particularly troubling in regard to the high costs associated with the program, the program's current status, and our United States Marine Corps reputation for plans and preparations. Part of serving as the Nation's force-in-readiness is our ability to plan, prepare, and maintain both perception and reality that the Marine Corps is most ready when the Nation is least ready. One well-known statement toward Marine readiness came in 1971, during the "Pentagon Papers" investigation. When cross-examined and asked if the Marine Corps had been preparing to fight in Vietnam and Cambodia back in 1964, LtGen Victor H. Krulak famously replied yes and that "we were preparing to fight in a lot of other places, too."

How do we describe the plan to develop the F–35B? Let's try expensive to start. Development costs for the entire Joint Strike Fighter (JSF) program were estimated at $25 billion at inception in 1996[2] and by 2004 had grown 80 percent. Thankfully, in 2008 the Government Accountability Office (GAO) found there had been no additional in-

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creases in development costs. Unthankfully, this was because "development costs were held constant by reducing requirements, eliminating the alternate engine program, and spending management reserve faster than budgeted."[3] Late is an apt description for the program too. Once envisioned to have an initial operational capability (IOC) as early as 2010, IOC has now been put off to 2016. Our Marine Corps has had late weapons systems before. But we have never had a weapons system so expensive.[4]

What about acquisitions costs? From program start in 2001, the JSF was estimated to cost $233 billion[5] for total program acquisition.[6] This was the teaser price, the estimate grew to $245 billion in 2004, $279 billion in 2007, and in 2008 the JSF program office's estimate was $300 billion,[7] a 29 percent increase over the original figure. However, GAO found that this 2008 estimate was not reliable, comprehensive, accurate, well documented, or credible. Worse, no uncertainty analysis has been conducted (acquisition may cost $298 billion; it may cost $500 billion). The only thing that is certain, the $300 billion estimate was "virtually certain to be wrong."[8] In 2010, after a Nunn-McCurdy breach—a required formal review whenever program costs increase anywhere from 15 percent to 50 percent over expectations—GAO's latest 2011 estimate is a total JSF program acquisition cost of $383 billion. Using coarse analysis and acknowledging that from 2001 to 2011 estimated program cost grew about $16.7 billion a year, when IOC begins in 5 more years we might expect a $466 billion acquisition cost—exactly double the original estimate. (See Figure 1.)

But procurement costs are less than half of the problem; life cycle costs are the lion's share. In 2005 the estimated procurement and remaining life cycle costs, typically described as operations and support, were $245 billion and $344 billion,[9] respectively. In 2008, for the scheduled 2,457 aircraft, the program office's estimate had grown from $344 billion to $650 billion in operations and support costs. GAO reports that historically operations and support represent 72 percent of total costs. If acquisition represents 28 percent of total costs and GAO's $383 billion acquisition estimate holds true, then operations and support costs would be an estimated $985 billion. This figure grows to $1.198 trillion using the $466 billion acquisition cost estimate. For a more empirical and optimistic measure, assume support cost estimates increase by merely $306 billion over the next 6 years (as they have the past 6 years) for a total of $956 billion in support estimates in 2017. GAO says that the next official independent life cycle cost estimate for JSF is not scheduled until 2014.[10] However, a 21 April article appearing in *Bloomberg News* stated that the Pentagon's cost analysis and program evaluation group, which estimates $1 trillion in operation and support costs, was to complete a major F–35 review in May.[11]

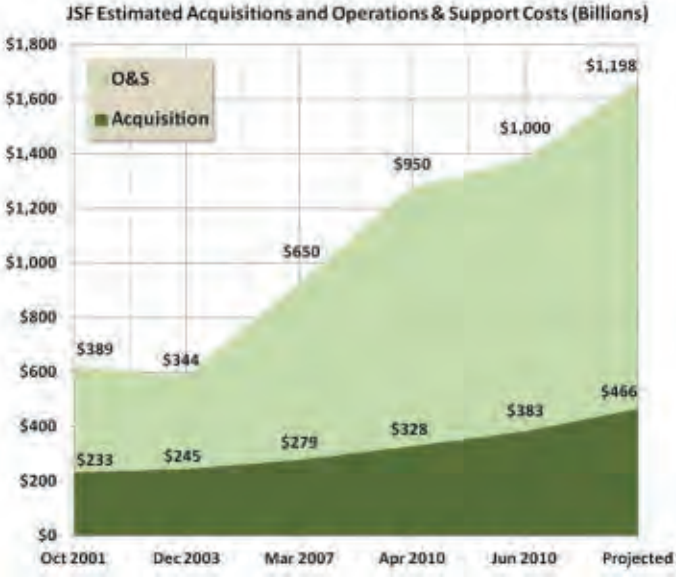
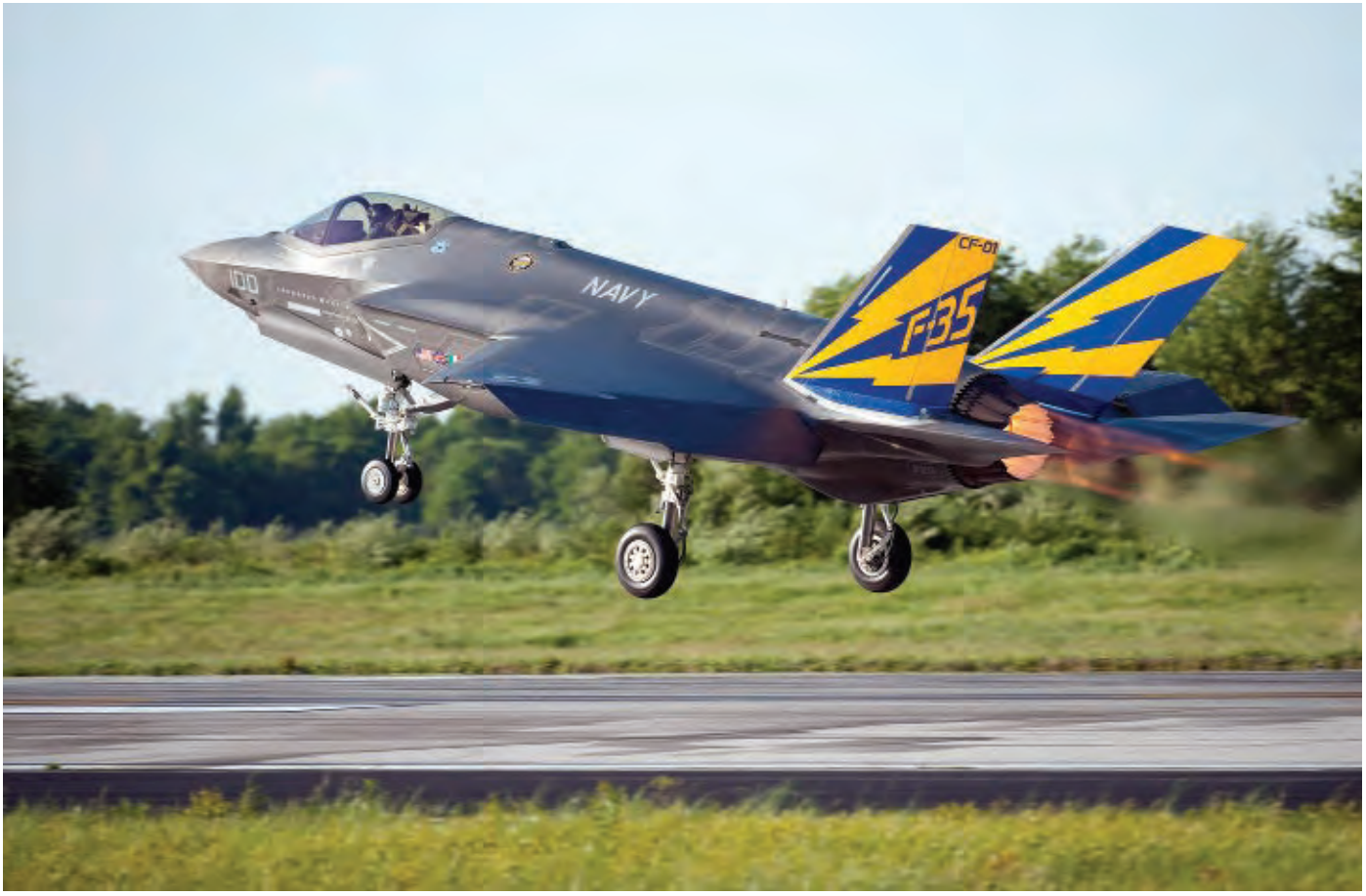


Figure 1. Estimated F–35 acquistions and operations and support costs, in billions. *(Graph provided by author.)*

So why are foreign militaries spending their money on the JSF? Simple, they are not. JSF's principal international partners include Australia, Canada, Denmark, Italy, the Netherlands, Norway, Turkey, and the United Kingdom (UK). None of these nations have received more than test models. Israel is a security cooperation partner, and the cost of their 19 F–35As has spiraled to $145 million each. Lockheed Martin is offsetting the costs by paying them $4 billion.[12] The UK, the only F–35B partner, canceled its F–35B program in favor of F–35Cs, which are capable of landing on an aircraft carrier and which won't be available before 2019. A British study suggests that C model operating costs will be 25 percent less than B models. Spain operates a version of the Harrier but has no scheduled buys. Italy's first four F–35s, scheduled to arrive in 2014, have been switched from STOVL to conventional aircraft.[13] At this point in the program, cancelling the F–35B only affects the Marine Corps.

This is the precipice where the STOVL variant stands now. In November 2010 the President's Fiscal Commission,[14] and in April 2011 *The New York Times*,[15] called for the elimination of the F–35B (as well as the V–22). *The Wall Street Journal*[16] has made similar suggestions as early as July 2010. In January 2011 the Secretary of Defense put the F–35B program in a 2-year probation period stating, "If we cannot fix this variant in this time frame and get it back on track in terms of performance, cost and schedule, then I believe it should be cancelled." This is after the program has been redesigned multiple times, and the program manager, a Marine major general, was fired in February 2010.

Program redesigns have not had favorable Marine outcomes recently. The expeditionary fighting (EFV) vehicle program had its final redesign in March of 2010,[17] when the projected acquisi-



The first Marine F–35 aircraft will be carrier-capable C models, pictured above, not STOVL-capable B models. *(Photo courtesy Lockheed Martin.)*

tion cost was $12 billion. At the time our senior leadership stated, "We have high hopes for these new vehicles."[18] Yet this did not prevent the program's cancellation in January 2011 when costs had increased to $14 billion. When current leadership expresses their high hopes for the F–35B, we can be certain that the Marine variant is set for cancellation. Hope, as the saying goes, is not a course of action.

So what does an F–35B plan B look like? What if the F–35B is part of the $400 billion in Department of Defense (DoD) cuts the President announced in April that he wanted to make over the next 10 years? First, plan B must source replacement aircraft for our Marine attack squadrons (VMAs). According to the fiscal year 2011 (FY11) Marine Fixed-Wing Aviation Plan, the VMA's mission is to "support the MAGTF commander by destroying surface targets, and escort friendly aircraft, day or night, under all weather conditions during expeditionary, joint or combined operations."

More specifically, *Marine Corps Warfighting Publication 3–2, Aviation Operations,* defines VMA missions as antiair warfare (AAW), offensive air support (OAS), and air reconnaissance, as well as escorting assault support missions. Marine leadership has a stated desire for aircraft able to deploy with the rest of our maneuver unit (i.e., STOVL jets flying off LHAs without well decks that the Navy built for us). This capability doubles the number of "carrier-type capital ships"—11 Navy carriers and 11 big-deck amphibs—that can deploy fifth-generation fighters. The FY11 plan, which preceded the F–35B program probation decision, called for a reduction in VMA squadrons from seven squadrons in FY13 to one remaining squadron in FY20. In light of the F–35B decision, the FY12 plan will deviate significantly from that proposed in FY11. Is the F–35B the only capability that can fulfill the VMA's mission?

Second, plan B must facilitate the transition plan of ship- and shore-based F/A–18 model aircraft. The carrier-based F–35C does not appear to be in jeopardy of cancellation. The Marine Corps already plans to buy 80 F–35Cs,[19] so even if the F–35B is cancelled, our Marine all-weather fighter/attack squadrons (VMFAs) have replacements in the pipe. Hence, changes to carrier aviation are not a critical part of any new plan B, yet it bears mentioning and watching as F–35 program costs continue to increase.

Third, plan B must include an airborne electronic attack (AEA) replacement capability, with the suspense being the planned sundown of Marine tactical electronic warfare squadrons (VMAQs) in FY19. Although often underestimated, this is a critical aviation function. Electronic warfare is important in establishing air superiority,

conducting strikes, supporting a broad array of efforts from shaping to decisive operations to stability operations, and in defeating modern antiaccess capabilities that may threaten our amphibious operations. Currently there are two Marine aviators on the Joint Chiefs of Staff. There are two STOVL aircraft the United States produces that can perform these required missions. If pay grades above our top two Marines decide to cancel the F–35B program, our Corps has two recourses—extend the other program (AV–8B) or completely redefine our requirement, concepts, and doctrines.

Politically, the easiest F–35B plan B would be to purchase F–35Cs earlier, while holding out hope for a reversal of the F–35B cancellation. This is essentially the plan General Electric (GE) enacted this year, continuing work on the JSF's alternative engine,[20] even though funding was cut in April 2011. GE's hope is that funding gets picked up again in the FY12 budget. Of the three requirements, this plan B merely hopes for a reversal in the cancellation of a desired VMA replacement, buys VMFA replacements earlier at more expense, and accepts undesirable risk in assuming that emerging jammer technology will fit into an immature JSF variant for VMAQ replacement. We can do better with less money.

The Marine Corps could start by departing from its recent history of leading edge, extremely risky acquisitions programs and focus on proven, efficient technologies. On the low end of the cost spectrum, a revised plan B could incorporate a small high-duration aircraft specializing in light attack, forward air control, and supporting counterinsurgency operations. This idea was proposed by the Imminent Fury project and supported by then Joint Forces Command's Gen James N. Mattis in 2009. Imminent Fury suggested immediately using an OV–10 or EMB 314 Super Tucano (flyaway cost, $9 million), which can loiter 6 hours unrefueled. Such a platform, if capable of launching and recovering from LHAs, could fulfill all VMA missions except for AAW. A long-term replacement could be procured in the 2028 time frame, when the Air Force may look toward replacing the A–10C with a similar aircraft.

On the high end, the Marine Corps could opt for the most capable AAW platform available, the F–22. Embracing an aircraft Congress recently voted to stop producing may seem like an extreme course of action, but it makes the most sense for the Marine Corps for several reasons. First, F–22s could be purchased now and would be cheaper initially and cost less to maintain than F–35s in the future. The current DoD plan is to buy 50 Marine Corps F–35B aircraft through 2016 at a cost of $9 billion, or $190 million per aircraft.[21] In 2011, flyaway costs for the F–22 are a reported $150 million per aircraft.[22]

. . . the F–22 dwarfs the F–35 in stealth, speed, survivability, deployability, and firepower.

The U.S. Air Force estimates flying hour costs for the F–22 are $44,259 per hour.[23] The 2008 GAO report[24] estimated $33,000 per flying hour in a JSF aircraft.[25] However, F–35B costs will likely be higher than A and C models. Additionally, the 2011 GAO update states that "current JSF life-cycle cost estimates are considerably higher than the legacy aircraft it will replace." If their most recent estimate of $1 trillion in operations and support costs proves true, F–35 flying hour costs will exceed $50,000 an hour. In other words, using current estimates, total life cycle costs for every F–35 exceeds that of an F–22 by almost $100 million per plane. Certainly there would be a cost to restart the F–22 manufacturing base, but this expense is easily dwarfed by these F–35 life cycle costs.

Most significantly, the F–22 dwarfs the F–35 in stealth, speed, survivability, deployability, and firepower. With a more mature and more powerful active electronically scanned array radar, and with planned upgrades, the F–22 is a more credible and less risky investment to fulfill the VMAQ's AEA mission. The F–22 also represents a better platform for AEA upgrades.

Significantly, this course of action would accept providing only 11 fifth-generation fighter-capable carriers. It may also require making inroads in positioning Marine F–22s in more expeditionary stations than those in Hawaii, Alaska, California, Nevada, New Mexico, Florida, and Virginia, where all F–22 aircraft are currently stationed. Forward postured Marine F–22s could provide the Nation with greater strategic reach than amphibious-based F–35Bs. With a supercruise speed of 1,220 miles per hour, an aerial refueled F–22 could make the 1,700-mile transit from Guam to Taiwan in less than 2 hours.

Future Marine Corps involvement with the F–22 program could include testing air-to-ground weapon loads on the four external 5,000-pound-rated hard points and incorporating some of the ambitious close air support-enabling avionics and software upgrades currently only planned in the F–35. In the future, this would provide the Marine Corps with the most capable, stealthy AAW fighter for day one of any campaign. In the latter days of a conflict, an upgraded F–22 could serve as our most efficient and effective OAS asset. With proper development, the same platform could serve as the MAGTF's AEA asset; conduct intelligence, surveillance, and reconnaissance; or even provide control for other aircraft or missiles. This would be all at less cost than the F–35B and without the threat of cancellation looming the next 2 years.

A high/low plan B could focus on acquiring approximately 60 F–22 aircraft to replace 5 F/A–18D squadrons scheduled to begin decommissioning in FY14 and removed from service by FY20. These aircraft would provide more capability and cost less than the estimates for the F–35B. For the cost of one F–35B, the Marine Corps could acquire and support 10 counterinsurgency-focused aircraft with a 6-hour loiter time. Seven squadrons, each consisting of 14 OV–10-like aircraft, could provide AV–8B replacements, gap the STOVL requirement while waiting for technology to mature, and pass the savings on to the taxpayer as part of the

Commander in Chief's $40 billion a year in cuts. Other options are available at less risk than betting on F–35B continuation in the next 2 years. It is time for an F–35B plan B.

Notes

1. Miramar Press Conference, Office of the Commandant of the Marine Corps, 7 December 2010.

2. GAO Report 5–271, *Tactical Aircraft: Opportunity to Reduce Risks in the Joint Strike Fighter Program With Different Acquisition Strategy,* Washington, DC, 15 March 2005.

3. GAO Report 08–388, *Joint Strike Fighter: Recent Decisions by DoD Add to Program Risks*, Washington, DC, 11 March 2008.

4. According to a 2009 GAO report the V–22 is the next most expensive. The aircraft is more expensive than our current fixed-wing aircraft with a $121.2 million (2009 dollars) average program unit cost and an estimated $75 billion in operations and support costs.

5. Unless otherwise noted, quoted GAO figures are the same as in their original reports, which are in then-year dollars.

6. GAO Report 11–325, *Joint Strike Fighter: Restructuring Places Program on Firmer Footing, but Progress Still Lags,* Washington, DC, 5 April 2011.

7. GAO Report 08–569T, *Joint Strike Fighter: Impact of Recent Decisions on Program Risks,* Washington, DC, 11 March 2008.

8. GAO–08–569T.

9. GAO–05–271.

10. GAO–08–569T.

11. *Lockheed Martin F–35 Operating Costs May Reach $1 Trillion,* accessed at Bloomberg.com, 21 April 2011. The Defense Acquisitions Board later postponed the cost estimate to fall 2011.

12. Fulghum, David A., Graham Warwick, Robert Wall, and Alon Ben-David, "JSF Cost Predictions Rattle Foreign Customers," *Aviation Week*, 23 March 2011.

13. Kington, Tom, "Italy Shuffles JSF STOVL Schedule, Mulls Cut in Numbers," *Defense News*, Washington, DC, 8 December 2010, available at http://www.fiscalcommission.gov/sites/fiscalcommission.gov/files/documents/Illustrative_List_11.10.2010.pdf.

14. Available at http://www.fiscalcommission.gov/sites/fiscalcomissions.gov/files/documents/Illustrative_List_11.10.2010.pdf.

15. Editorial, "A Rational Budget for the Pentagon," *The New York Times*, 20 April 2011, p. 22.

16. Shachtman, Noah, "The Air Force Needs a Serious Upgrade," *The Wall Street Journal*, 15 July 2010, p. 17.

17. Grant, Greg, "Conway Bullish on EFV Redesign," DoD Buzz at Military.com, 30 March 2010.

18. Conway, Gen James T., quoted in "Conway Bullish on EFV Redesign," by Greg Grant, DoD Buzz at Military.com, 30 March 2010.

19. Cavas, Christopher P., "U.S. Navy Details JSF Buy," *Defense News,* Washington, DC, 14 March 2011.

20. The Associated Press, "GE cutting work on alternate JSF engine," *The Military Times*, 12 April 2011.

21. GAO–11–325.

22. United States Air Force, *FY2011 Budget Estimates,* Headquarters, U.S. Air Force, Washington, DC, February 2010, p. 1–15.

23. Smith, Jeffrey R., "Premier U.S. Fighter Jet Has Major Shortcomings," *The Washington Post*, 10 July 2009.

24. GAO–08–569T.

25. The 2008 GAO report assumed 2,458 aircraft built, flying 8,000 hours each and $24 billion a year in operating costs over roughly 27 years. This works out to approximately $33,000 per hour.